2010 HSC Mathematics Extension 1
Marking Guidelines

Question 1 (a)

Criteria	Marks
• Correct primitive	1

Question 1 (b)

Criteria	Marks
• Correct answer	1

Question 1 (c)

Criteria	Marks
• Correct solution	3
• Obtains $x = 3, -2$, or equivalent merit	2
• Attempts to obtain $x + 6 = x^2$, or equivalent merit	1

Question 1 (d)

Criteria	Marks
• Correct solution	3
• Makes substantial progress	2
• Recognises an appropriate method	1

Question 1 (e)

Criteria	Marks
• Correct solution	3
• Correct primitive in terms of u, or equivalent merit	2
• Obtains $-\left(1-u\right)\sqrt{u}$ as the integrand, or equivalent merit	1

Question 1 (f)

Criteria	Marks
• Correct answer	1

Question 2 (a)

Criteria	Marks
• Correct solution	2
• Uses the identity $\sin^2 x = \dfrac{1-\cos 2x}{2}$, or equivalent merit	1

Question 2 (b) (i)

Criteria	Marks
• Correct solution	1

Question 2 (b) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to solve $20 = 36 - 35.5e^{-10k}$	1

Question 2 (b) (iii)

Criteria	Marks
• Correct answer	1

Question 2 (c) (i)

Criteria	Marks
• Correctly finds a and b	2
• Shows an understanding of the remainder theorem	1

Question 2 (c) (ii)

Criteria	Marks
• Correct answer	1

Question 2 (d)

Criteria	Marks
• Correct solution	3
• Finds $\dfrac{dr}{dx}$ in terms of x, or equivalent merit	2
• Recognises $\dfrac{dr}{dt} = \dfrac{dr}{dx} \cdot \dfrac{dx}{dt}$ OR $r^2 = x^2 + 36$, or equivalent merit	1

Question 3 (a) (i)

Criteria	Marks
• Correct answer	1

Question 3 (a) (ii)

Criteria	Marks
• Correct answer	1

Question 3 (b) (i)

Criteria	Marks
• Finds x coordinates correctly	3
• Finds $f''(x)$ correctly, or equivalent merit	2
• Finds $f'(x)$ correctly, or equivalent merit	1

Question 3 (b) (ii)

Criteria	Marks
• Correct explanation	1

Question 3 (b) (iii)

Criteria	Marks
• Finds $f^{-1}(x) = \sqrt{-\ln x}$	2
• Makes some progress by correctly taking logarithms of both sides	1

Question 3 (b) (iv)

Criteria	Marks
• Correct answer, ie $0 < x \le 1$	1

Question 3 (b) (v)

Criteria	Marks
• Correct graph	1

Question 3 (b) (vi) (1)

Criteria	Marks
• Correct solution	1

Question 3 (b) (vi) (2)

Criteria	Marks
• Substitutes 0.65 and draws a correct conclusion	1

Question 4 (a) (i)

Criteria	Marks
• Correct answer	1

Question 4 (a) (ii)

Criteria	Marks
• Correct answer	1

Question 4 (a) (iii)

Criteria	Marks
• Correct solution	2
• Finds that the maximum value occurs at $x = -2$, or equivalent merit	1

Question 4 (b) (i)

Criteria	Marks
• Correct answer	3
• Correctly finds either a value for R, or a value for α	2
• Expresses $2\cos\theta + 2\cos\left(\theta + \dfrac{\pi}{3}\right)$ as $3\cos\theta - \sqrt{3}\sin\theta$, or equivalent merit	1

Question 4 (b) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to solve the equation using the result from part (i), or equivalent merit	1

Question 4 (c)

Criteria	Marks
• Correct proof	3
• Makes significant progress	2
• Finds one piece of relevant information	1

Question 5 (a) (i)

Criteria	Marks
• Correct solution	3
• Finds relevant expressions for TWO of *AP*, *PT*, *BP*	2
• Finds a relevant expression for ONE of *AP*, *PT*, *BP*	1

Question 5 (a) (ii)

Criteria	Marks
• Correct solution	1

Question 5 (b) (i)

Criteria	Marks
• Correct solution	3
• Correctly shows that $f'(x) = 0$, or equivalent merit	2
• Attempts to differentiate $f(x)$, or equivalent merit	1

Question 5 (b) (ii)

Criteria	Marks
• Correct graph	1

Question 5 (c) (i)

Criteria	Marks
• Correct explanation	1

Question 5 (c) (ii)

Criteria	Marks
• Correct explanation	1

Question 5 (c) (iii)

Criteria	Marks
• Correct proof	2
• Shows that $\angle TAC = \angle ABD$, or that $\angle XDB = \angle BAD$, or equivalent merit	1

Question 6 (a) (i)

Criteria	Marks
• Correct solution	1

Question 6 (a) (ii)

Criteria	Marks
• Correct deduction	1

Question 6 (b) (i)

Criteria	Marks
• Correct solution	3
• Makes substantial progress	2
• Uses $(x,y) = (d,h)$ and attempts to eliminate t	1

Question 6 (b) (ii) (1)

Criteria	Marks
• Correct answer	1

Question 6 (b) (ii) (2)

Criteria	Marks
• Correct answer	1

Question 6 (b) (iii)

Criteria	Marks
• Correct solution	2
• Correctly differentiates $F(\theta)$	1

Question 6 (b) (iv)

Criteria	Marks
• Correct solution	1

Question 6 (b) (v)

Criteria	Marks
• Correct explanation	2
• Recognises that v^2 is a minimum when $F(\theta)$ is a maximum, or equivalent merit	1

Question 7 (a)

Criteria	Marks
• Correct proof	3
• Makes substantial progress	2
• Shows the statement is true for $n = 1$, or equivalent merit	1

Question 7 (b) (i)

Criteria	Marks
• Substitutes $x = 1$	1

Question 7 (b) (ii)

Criteria	Marks
• Correct answer	1

Question 7 (b) (iii)

Criteria	Marks
• Correct solution	2
• Differentiates both sides of $(1+x)^n = \binom{n}{0} + \ldots + \binom{n}{n} x^n$ correctly, or equivalent merit	1

Question 7 (c) (i)

Criteria	Marks
• Correct explanation	1

Question 7 (c) (ii)

Criteria	Marks
• Correct explanation	1

Question 7 (c) (iii)

Criteria	Marks
• Correct solution	3
• Writes an expression summing from r = 0 to *n*, or equivalent progress	2
• Determines number of selections for a particular *r*, or equivalent merit	1

Mathematics Extension 1

2010 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
1 (a)	1	15.5E	HE4
1 (b)	1	15.2E	HE4
1 (c)	3	12.2	H3
1 (d)	3	1.4E	PE3
1 (e)	3	11.5E	HE4
1 (f)	1	18.2E	HE3
2 (a)	2	13.6E	HE6, H5
2 (b) (i)	1	14.2E	HE3
2 (b) (ii)	2	14.2E	HE3
2 (b) (iii)	1	14.2E	HE3, HE7
2 (c) (i)	2	16.2E	PE3
2 (c) (ii)	1	16.2E	PE3
2 (d)	3	14.1E	HE5
3 (a) (i)	1	18.1E	PE3
3 (a) (ii)	1	18.1E	PE3
3 (b) (i)	3	10.4, 12.5	H3, H5
3 (b) (ii)	1	15.1E	HE4, HE7
3 (b) (iii)	2	15.1E, 12.2, 12.3	HE4, H3
3 (b) (iv)	1	15.1E	HE4
3 (b) (v)	1	15.1E	HE4
3 (b) (vi) (1)	1	16.4E	HE7
3 (b) (vi) (2)	1	16.4E	HE7
4 (a) (i)	1	14.3E	HE3
4 (a) (ii)	1	14.3E	HE3
4 (a) (iii)	2	14.3E	HE3
4 (b) (i)	3	5.7E, 5.9E, 13.1	HE3
4 (b) (ii)	2	5.7E, 5.9E, 13.1	HE3, HE7, H5
4 (c)	3	9.6E, 6.8	PE3, PE4, HE7
5 (a) (i)	3	5.6E	PE2, PE6

Question	Marks	Content	Syllabus outcomes
5 (a) (ii)	1	5.6E	PE2, PE6
5 (b) (i)	3	15.5E, 15.4E	HE4, HE5
5 (b) (ii)	1	4.2, 15.2E, 15.3E	HE4, HE7
5 (c) (i)	1	2.10	PE2, PE3, HE7
5 (c) (ii)	1	2.10	PE2, PE3, HE7
5 (c) (iii)	2	2.10	PE2, PE3, HE7
6 (a) (i)	1	5.7E	PE2, HE7
6 (a) (ii)	1	5.7E, 5.9E, 13.1	PE2, HE7
6 (b) (i)	3	14.3E	HE3, HE7
6 (b) (ii) (1)	1	14.3E	HE3, HE7
6 (b) (ii) (2)	1	13.4, 14.3E	HE3, HE7
6 (b) (iii)	2	13.5	HE3, HE7
6 (b) (iv)	1	5.7E	HE3, HE7
6 (b) (v)	2	14.3E	HE3, HE7
7 (a)	3	7.4E	HE2
7 (b) (i)	1	17.3E	HE7
7 (b) (ii)	1	17.3E	HE7
7 (b) (iii)	2	17.3E	HE7
7 (c) (i)	1	18.1E	PE2, PE3
7 (c) (ii)	1	18.1E	PE2, PE3
7 (c) (iii)	3	18.1E	PE2, PE3